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10/519,109	07/26/2006	Thomas J Nelson	17357.01401US	9478

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EXAMINER

LUNDGREN, JEFFREY S

ART UNIT	PAPER NUMBER
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1639

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/519,109	Applicant(s) NELSON ET AL.	
	Examiner JEFFREY S. LUNDGREN	Art Unit 1639	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/11/2005; 1/11/2007</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Status of the Claims

Claims 1-7 are pending in the instant application and are the subject of the Office Action below.

Information Disclosure Statement

The information disclosure statements (IDSs) submitted on April 11, 2005, and January 11, 2007, have been considered by the Examiner. The submissions are in compliance with the provisions of 37 CFR § 1.97. Enclosed with this Office Action are return copies of the Forms PTO-1449 with the Examiner's initials and signature indicating those references that have been considered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-7 are anticipated by Nelson:

Claims 1-7 are rejected under 35 U.S.C. § 102(a) as being anticipated by Nelson *et al.*, *Molecular and Cellular Proteomics*, 1.3:253-259 (2002).

Claim 1 is directed towards a method of isolating, from a mixture of proteins, a subpopulation consisting essentially of proteins that engage in protein-protein interactions, comprising:

- (a) contacting the mixture with a chemically reactive support under conditions that permit;

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- (i) covalent binding of proteins to the support, and
- (ii) protein-protein interactions;
- (b) permitting proteins in the mixture to become covalently bound to the support;
- (c) separation of the support from any proteins not bound thereto;
- (d) subjecting the support to conditions that disrupt protein-protein interactions; and
- (e) separating the support from any proteins not bound thereto.

Claim 7 is similar is similar to the isolation method of claim 1, but relates to a detection method.

Nelson teaches a method for isolating and identifying proteins participating in protein-protein interactions in a complex mixture. The method uses a chemically reactive support matrix to isolate proteins that are non-covalently bound to other proteins. Because the proteins are accessible to chemical manipulation, mass spectrometric identification (as in claim 7) of the proteins can yield information on specific classes of interacting proteins, such as calcium-dependent or substrate-dependent protein interactions. This permits selection of a subpopulation of proteins from a complex mixture on the basis of specified interaction criteria. The new method has the advantage of screening the entire proteome simultaneously, unlike the two-hybrid system or phage display, which can only detect proteins binding to a single bait protein at a time.

As in claims 2 and 3, the chemically reactive support taught in Nelson is a cyanogen bromide on a Sepharose support.

As in claims 4-6, the support of Nelson is the cross-linked polymer gel of Sepharose (*i.e.*, an agarose composition).

Accordingly, claims 1-7 are anticipated by Nelson.

Claims 1 and 4-7 are anticipated by Stroobant:

Claims 1 and 4-7 are rejected under 35 U.S.C. § 102(e) as being anticipated by Stroobant, U.S. Patent No. 7,208,268, issued on April 24, 2007.

Claim 1 is directed towards a method of isolating, from a mixture of proteins, a subpopulation consisting essentially of proteins that engage in protein-protein interactions, comprising:

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- (a) contacting the mixture with a chemically reactive support under conditions that permit;
 - (i) covalent binding of proteins to the support, and
 - (ii) protein-protein interactions;
- (b) permitting proteins in the mixture to become covalently bound to the support;
- (c) separation of the support from any proteins not bound thereto;
- (d) subjecting the support to conditions that disrupt protein-protein interactions; and
- (e) separating the support from any proteins not bound thereto.

Claim 7 is similar is similar to the isolation method of claim 1, but relates to a detection method.

Stroobant teaches methods for identifying, isolating and comparing proteins and other biomolecules differing between two complex biological samples using affinity chromatography and phage display techniques (see Abstract). Stroobant illustrates an aspect of the invention in Figure 1 where a mixture of proteins are covalently immobilized on a support (as in parts (a) and (b) of claims 1 and 7; Stroobant defines "adhering" as including covalent attachment – col. 3, lines 57-59), removing non-immobilized proteins (as in part (c) of claims 1 and 7; Stroobant, col. 7, lines 3-54); Stroobant then introduces phage that display proteins that may bind with the covalently immobilized proteins, followed by washing and elution of bound phage (i.e., disrupting the protein-protein interactions, as in step (d) of the independent claims. The general methods is described as follows:

“In one aspect, the invention provides a method of identifying a protein, polypeptide or other biomolecule that involves (a) adhering a complex biological sample from a first type of individual to a support to create an array; (b) adhering a complex biological sample from a second type of individual to a support to create an array; (c) exposing a peptide-nucleic acid coupled library at least one time to an array formed by step (a) to create a first product; and (d) exposing the first product at least one time to an array formed by step (b) to create a second product.”

Stroobant, col. 2, lines 39-48.

As in claims 4-6, the support disclosed in Stroobant is Sepharose (col. 7, lines 3-6).

Accordingly, claims 1 and 4-7 are anticipated by Stroobant.

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Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. § 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-7 are obvious over Stroobant and Chu:

Claims 1-7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Stroobant, U.S. Patent No. 7,208,268, issued on April 24, 2007, in view of Chu *et al.*, U.S. Patent No. 5,962,652, issued on October 5, 1999.

The limitations of claims 1 and 4-7, as well as the corresponding teachings in Stroobant, is found in the rejection above, and hereby incorporated by reference.

Although Stroobant teaches a method wherein the proteins from the sample mixture being adhered to the substrate through covalent and non-covalent coupling chemistry, such as Sulfo-NHS-LC-Biotin covalent chemistry for reaction to streptavidin Sepharose (col. 10, lines 1-54), Stroobant does not explicitly teach the use of a support that has cyanate groups as in claims 2 and 3.

Chu is directed towards a biotechnology application for analyzing levels of the protein FAF1, wherein the methods involve a number of routine manipulations and chemistries for protein immobilization. Certain of the immobilization strategies of Chu are directed towards affinity immobilization, such as biotin avidin, and others are directed towards covalent coupling. Chu states:

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“In one embodiment of the first method, a FAF1 polypeptide is immobilized on a solid matrix. The solid matrix can comprise various materials such as is commonly used in column chromatography, including sepharose, sephadex, agarose, polystyrene and latex beads. The solid matrix can also be filter paper or membrane, such as nitrocellulose and polyvinylidene fluoride (PVDF) membrane. The FAF1 polypeptide can be coupled to the solid matrix directly or indirectly. Direct methods include covalent coupling to sepharose beads using cyanogen bromide. Indirect coupling can take advantage of an FAF1 antibody or some other moiety suitable for linking the two components such as biotin-avidin binding pairs. FAF1 or FAF1 fusion proteins may be more conveniently immobilized if the fusion protein can bind a ligand provided on the matrix.”

Chu, col. 17, line 62 to col. 18, line 9.

One of ordinary skill in the art would have had a reasonable expectation of success in arriving at the invention as claimed because each of Stroobant and Chu are familiar with well-known protein immobilization chemistries, and would expect that both a non-covalent biotin-avidin strategy and a covalent CNBr strategy would provide suitable immobilization means for proteins to a substrate with predictable results. Therefore, the invention as a whole was prima facie obvious at the time it was invented.

Common Ownership of Claimed Invention Presumed

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the Examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR § 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the Examiner to consider the applicability of 35 U.S.C. § 103(c) and potential 35 U.S.C. §§ 102(e), (f) or (g) prior art under 35 U.S.C. § 103(a).

Conclusions

No claim is allowable.

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If Applicants should amend the claims, a complete and responsive reply will clearly identify where support can be found in the disclosure for each amendment. Applicants should point to the page and line numbers of the application corresponding to each amendment, and provide any statements that might help to identify support for the claimed invention (*e.g.*, if the amendment is not supported *in ipsis verbis*, clarification on the record may be helpful). Should Applicants present new claims, Applicants should clearly identify where support can be found in the disclosure.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Jeff Lundgren whose telephone number is 571-272-5541. The Examiner can normally be reached from 7:00 AM to 5:30 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Christopher Low, can be reached on 571-272-0951. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Jeffrey S. Lundgren/

Patent Examiner, Art Unit 1639